

EXPRESS MAIL NO.: EV343426540US

WHAT IS CLAIMED IS:

1. A method of using SACVD deposition to deposit at least one layer of dielectric material inside a deposition reactor during the fabrication of at least one semiconductor integrated circuit, said method comprising the steps of:
 - providing a reaction chamber for carrying out SACVD deposition;
 - supplying a stream of a first reaction gas containing oxygen plasma into a gas feed conduit connected to the reaction chamber;
 - applying microwaves inside the gas feed conduit in order to produce sufficient oxygen radicals from the oxygen plasma, the oxygen radicals being necessary to initiate SACVD deposition;
 - supplying a stream of a second reaction gas into the reaction chamber, the second reaction gas being suitable to initiate SACVD deposition when reacting with oxygen radicals; and
 - supplying the first reaction gas in which sufficient oxygen radicals have been produced from oxygen plasma into the reaction chamber to perform an SACVD deposition within the reaction chamber through reaction of oxygen radicals with the second reaction gas.
2. The method as defined in claim 1,
 - wherein in the step of supplying the stream of the first reaction gas, the first reaction gas is oxygen, and
 - in the step of applying microwaves, an oxygen plasma containing oxygen radicals is produced.
3. The method as defined in claim 1, wherein the microwave activation pressure is 1.5 Torr.

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4. The method as defined in claim 1, wherein in the step of supplying the first reaction gas in which sufficient oxygen radicals have been produced from oxygen plasma into the reaction chamber, a remote plasma of the first reaction gas is forced into the reaction chamber.
5. The method as defined in claim 1, wherein the reaction pressure is within the range of 1 to 700 Torr.
6. A deposition reactor for performing SACVD deposition to deposit at least one layer of dielectric material during the fabrication of at least one semiconductor integrated circuit, said reactor comprising:
 - a gas feed conduit for supplying a stream of a remote plasma of a reaction gas into the reactor; and
 - means for applying microwaves inside the gas feed conduit of the reactor in order to produce sufficient radicals of the reaction gas to initiate a deposition reaction.
7. The reactor as defined in claim 6, wherein the gas feed conduit supplies a stream of a remote plasma of oxygen into the reactor.
8. The reactor as defined in claim 6, wherein the microwave activation pressure is 1.5 Torr.
9. The reactor as defined in claim 6, further comprising means for forcing the stream of the remote plasma of the reaction gas into the reactor.
10. The reactor as defined in claim 6, wherein the reaction pressure is within the range of 1 to 700 Torr.

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11. A deposition reactor for performing an SACVD deposition technique for fabricating a semiconductor integrated circuit, said reactor comprising:
 - a reaction chamber;
 - a heater for heating the chamber;
 - at least one reaction gas feed conduit for supplying a reaction gas to the interior of the chamber; and
 - a magnetron device on the feed conduit for producing sufficient radicals of the reaction gas within the chamber to initiate a deposition reaction.
12. The reactor as defined in claim 11, further comprising a gas feed pump on the conduit for forcing the reaction gas into the chamber.
13. The reactor as defined in claim 12, wherein the gas feed pump is located downstream of the magnetron device.
14. The reactor as defined in claim 11, wherein the reaction gas is oxygen.
15. The reactor as defined in claim 11, wherein the microwave activation pressure is 1.5 Torr.
16. The reactor as defined in claim 11, wherein the reactor produces a reaction pressure within the range of 1 to 700 Torr.
17. The method as defined in claim 1, wherein ozone is not supplied as a process gas in performing the SACVD deposition within the reaction chamber.
18. The method as defined in claim 2, wherein ozone is not supplied as a process gas in performing the SACVD deposition within the reaction chamber.

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19. A method of using SACVD deposition to deposit at least one layer of dielectric material inside a deposition reactor during the fabrication of at least one semiconductor integrated circuit, said method comprising the steps of:

supplying an oxygen plasma into a reaction chamber;

applying microwaves to the oxygen plasma in order to produce sufficient free oxygen radicals from the oxygen plasma to initiate SACVD deposition; and

supplying the free oxygen radicals that have been produced into the reaction chamber of the reactor to perform SACVD deposition within the reaction chamber through reaction of the oxygen radicals.

20. The method as defined in claim 19, wherein the microwave activation pressure is 1.5 Torr.

21. The method as defined in claim 19, wherein in the step of supplying the free oxygen radicals into the reaction chamber, the free oxygen radicals are forced into the reaction chamber.

22. The method as defined in claim 19, wherein ozone is not supplied as a process gas in performing the SACVD deposition within the reaction chamber.

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23. The method as defined in claim 19, wherein the step of applying microwaves includes the sub-steps of:

- receiving the oxygen plasma that is supplied at a magnetron;
- operating the magnetron to produce the microwaves that are applied to the oxygen plasma; and
- discharging a stream of the oxygen plasma from the magnetron.

24. A method of using SACVD deposition to deposit at least one layer of dielectric material inside a deposition reactor during the fabrication of at least one semiconductor integrated circuit, said method comprising the steps of:

- providing a reaction chamber for carrying out SACVD deposition;
- supplying a stream of oxygen to a magnetron;
- operating the magnetron to produce microwaves so as to generate within the magnetron an oxygen plasma containing sufficient free oxygen radicals to initiate SACVD deposition;
- discharging a stream of the oxygen plasma from the magnetron; and
- supplying the stream of the oxygen plasma from the magnetron into the reaction chamber to perform SACVD deposition within the reaction chamber through reaction of the oxygen radicals.

25. The method as defined in claim 24, wherein the microwave activation pressure is 1.5 Torr.

26. The method as defined in claim 24, wherein in the step of supplying the stream of the oxygen plasma into the reaction chamber, the stream of the oxygen plasma is forced into the reaction chamber.

27. The method as defined in claim 24, wherein ozone is not supplied as a process gas in performing the SACVD deposition within the reaction chamber.